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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Andrew L. Norrell et al.

Application No.: 10/072,833

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Examiner: Singh, Ramnandan P.

For: LOOP EXTENDER WITH SELECTABLE LINE TERMINATION AND EQUALIZATION

Confirmation No.: 3740

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37(a)

This is an appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner dated October 19, 2006, which finally rejected claims 1-10, 18-26, and 44-49 in the above-identified application. The Office date of receipt of Appellant's Notice of Appeal was January 19, 2007. This Appeal Brief is hereby submitted pursuant to 37 C.F.R. § 41.37(a).

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the full interest in the invention, 2Wire, Inc.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

III. STATUS OF CLAIMS

Claims 1-49 are pending in the application. In particular, claims 18-25 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,226,322 to Mukherjee (hereinafter "Mukherjee"). Claims 1-9 and 44-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee. Claims 10, 26, and 46-49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee as applied to claims 9 and 25. Claims 31-43 stand allowed. Claims 11-17 and 27-30 stand objected to as depending from a rejected independent claim, but would be allowable if rewritten in independent form to include all intervening claim limitations.

Claims 1-30 and 44-49 are the subject of this appeal. A copy of claims 1-49 as they stand on appeal is set forth in the Claims Appendix.

IV. STATUS OF AMENDMENTS

No amendments have been submitted subsequent to the Final Office Action mailed January 19, 2007. This Appeal Brief does address the Advisory Action mailed on 2-21-2007 as well as the previous Office Actions

V. SUMMARY OF CLAIMED SUBJECT MATTER

This section of this Appeal Brief is set forth to comply with the requirements of 37 C.F.R. § 41.37(c)(1)(v) and is not intended to limit the scope of the claims in any way. Exemplary implementations of the limitations of independent claims 1, 18, 31, 44, and 45 are described below.

In general:

Independent claim 1 relates to a system 200 as shown in Figure 2 for improving transmission of digital subscriber line (DSL) signals over a local loop 214-220. The system may include a central office having one or more DSL modems 202, customer premises having one or more DSL modems 204-210 and one or more loop extenders 224-230. (See Figure 2 and Specification paragraphs 0016-0025.)

ADSL uses the frequency band between about 25 kHz and 120 kHz to transmit upstream signals (signals from a customer premises to a central office) from a DSL modem and the frequency band between about 150 kHz to 1.104 MHz to transmit downstream signals (signals from the central office to a customer premises) from a DSL modem. Specification paragraph 0005 and page 3 of 'Understanding Digital Subscriber Line Technology' by Starr a considered prior art reference and incorporated by reference in the Specification in paragraph 0010.

"Moreover, as those skilled in the art will appreciate, central office 202 and each of customer premises 204, 206, 208, and 210 includes a DSL termination device, such as a DSL modem, for transmitting and receiving DSL signals over an associated local loop." (Specification paragraph 0025)

Referring to Figure 4, a first loop extender 224 may be capacitively coupled via capacitors 364, 366, 372, and 374 to the local loop 214. Referring to Figure 4, the first loop extender 224 may include a plurality of upstream complex impedances 406 coupled in parallel. The first loop extender 224 may include a plurality of downstream complex impedances 408 coupled in parallel. The first loop extender 224 may include a first upstream filter and amplifying element 404 coupled to the plurality of upstream complex impedances 406 via a first switch 414. The first loop extender 224 may include a first downstream filter and amplifying element 402 coupled to the plurality of downstream complex impedances 408 via a second switch 416. (See Figure 4 and Specification paragraphs 0037-0043.)

Independent claim 18 relates to a method of improving transmission of digital subscriber line (DSL) signals over a local loop. A loop extender 224 is configured with a

plurality of upstream complex impedances 406 coupled in parallel, a plurality of downstream complex impedances 408 coupled in parallel, a plurality of upstream filter and amplifying elements 404 coupled in parallel and coupled in series with the plurality of upstream complex impedances 406, and a plurality of downstream filter and amplifying elements 402 coupled in parallel and coupled in series with the plurality of downstream complex impedances 408. (See Figure 4 and Specification paragraphs 0037-0043.)

Independent claim 31 relates to a system as shown in Figure 5 for improving transmission of digital subscriber line (DSL) signals over a local loop. The system may include selectable line termination 406a-d, 408a-d and equalization (SLTE) DSL amplification circuitry 404a-b, 402a-b, capacitively coupled via capacitors 364, 366, 372, and 374 to the local loop 214 via bypass relay switches 510, 512. A plain old telephone service (POTS) loading coil 308 is adapted to be coupled to the local loop 214 for improving transmission of POTS band signals over the local loop 214. (See Figure 5 and Specification paragraphs 0044-0046.)

Referring to figure 6, a diagnostic and control unit 602 coupled via a bypass relay 604 that controls switches 606 to the local loop 214 for receiving and processing control signals from a central office. The a diagnostic and control unit 602 is coupled to the bypass relay switches, shown on figure 5 510, 512, via switch control lines 516-522 and is coupled to the SLTE DSL amplification circuitry 505 via a plurality of switch control lines 516-522 for controlling the SLTE DSL amplification circuitry 505. (See Figures 5 and 6 and Specification paragraphs 0047-0051.)

Independent claim 44 relates to a method for improving transmission of digital subscriber line (DSL) signals over a local loop. Referring to figures 5 and 6, control signals and DSL signals are transmitted over the local loop 214. DSL signal amplification is provided via selectable line termination 406a-d, 408a-d and equalization (SLTE) DSL amplification circuitry 404a-b, 402a-b coupled to the local loop 214. The

control signals are received via a diagnostic and control unit (DCU) 602 coupled to the local loop 214. The control signals are processed. The SLTE DSL amplification circuitry switch 505 selects states in accordance with the processed control signals. DSL signals are sampled within the SLTE DSL amplification circuitry 505. The sampled DSL signals are processed. The SLTE DSL amplification circuitry switch 505 selects states in accordance with the processed sampled DSL signals to improve SLTE DSL amplification circuitry performance. The SLTE DSL amplification circuitry 505 is uncoupled from the local loop 214 in accordance with the processed control signals. (See Figures 5 and 6 and Specification paragraphs 0044-0051.)

Independent claim 45 relates to a system for improving transmission of digital subscriber line (DSL) signals. The system may include means for transmitting control signals 614 and DSL signals 402, 404. The system may include means for providing selectable DSL signal amplification 511, 513 coupled to the means for transmitting 402, 404. The means for receiving the control signals 602 is coupled to the means for providing DSL signal amplification 505. The means for processing the control signals 602 generates processed control signals. The means for improving performance, from the central office 202, of the means for providing DSL signal amplification 505 improves it in accordance with the processed control signals. The means for sampling the DSL signals 614 may be within the means for providing selectable DSL signal amplification 505. The means for processing the sampled DSL signals 614 generates processed sampled DSL signals. The means for improving performance, from the central office 202, of the means for providing DSL signal amplification 505 improves it in accordance with the processed sampled DSL signals. The means for uncoupling 604 the means for providing DSL signal amplification 505 from the means for transmitting 402, 404 uncouples in accordance with the processed control signals. (See Figures 5 and 6 and Specification paragraphs 0044-0051.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I. Whether Mukherjee discloses the limitations in claims 18-25 under 35 U.S.C. § 102(e) and claims 1-9 and 44-49 under 35 U.S.C. § 103(a)?

II. Whether Mukherjee fails by itself to adequately provide motivation to combine asserted well known features to achieve applicants claimed invention?

VII. ARGUMENT

For the purposes of this appeal, the claims stand or fall together.

A DSL MODEM IS NOT A LOOP EXTENDER

Response to Rejections under 35 U.S.C. § 102(e)

The Office Action rejected claims 18-25 under 35 U.S.C. § 102(e) as being anticipated by Mukherjee. Applicant respectfully requests withdrawal of these rejections because the cited reference fails to disclose all of the limitations of the claims.

CLAIMS 18-30 AND 48-49

Claim 18 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Mukherjee. Applicant respectfully submits that claim 18 is patentable over the cited reference because Mukherjee does not disclose all of the limitations of the claim. Claim 18 recites:

> A method of improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:
>
> **configuring a loop extender** with
>
> a plurality of upstream complex impedances coupled in parallel;
>
> a plurality of downstream complex impedances coupled in parallel;
>
> a plurality of upstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of upstream complex impedances; and
>
> a plurality of downstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of downstream complex impedances.

(Emphasis added).

The examiner fails to recognize the distinction that a 'DSL modem' is not a 'loop

extender' despite all of applicant's previous amendments. Even the latest advisory action mailed 2/21/2007, keeps referencing that the DSL modem described in Mukherjee discloses the parts and operational characteristics of applicant's claimed loop extender.

Most of the prior art patent documents considered by the examiner on the 1449 form discuss 'repeaters' and 'DSL repeaters,' which can be a form of a 'loop extender.' Moreover, two of the prior art patent documents considered by the examiner:

United States Published Patent Application number 20020106012 titled "Loop extender with communications, control, and diagnostics." makes it clear that one skilled in the art would not confuse 'a DSL modem' with a 'loop extender.'

United States Published Patent Application number 20020106076 titled " Line powered loop extender with communications, control, and diagnostics" makes it clear that one skilled in the art would not confuse 'a DSL modem' with a 'loop extender.'

Also, applicants own specification and drawings make it clear that a DSL modem located in a central office or customer premises is not a 'loop extender.' Applicants figure 2 shows a system that may include a central office having one or more DSL modems 202, customer premises having one or more DSL modems 204-210 and one or more loop extenders 224-230. (See Figure 2 and Specification paragraphs 0016-0025.) "As those skilled in the art will appreciate, central office 202 and each of customer premises 204, 206, 208, and 210 includes a DSL termination device, such as a DSL modem, for transmitting and receiving DSL signals over an associated local loop." (Specification paragraph 0025)

Accordingly, Mukherjee discloses an inventive DSL modem and its parts as well as discloses a distinctly different apparatus called a DSL repeater that may cooperate

with the inventive DSL modem. Thus, Mukherjee discloses:

> Digital subscriber modems (8, 15) for use in Asynchronous Digital Subscriber Line (ADSL) communications are disclosed. Each modem includes a digital transceiver function (10, 13) and an analog front end function (10, 11), where the analog front end function (10, 11) is integrated into a single integrated circuit. According to the disclosed embodiments, the analog front end functions (10, 11) each include a transmit and a receive side. (Mukherjee, Abstract)
>
> [Claim] 17. A digital subscriber line modem, comprising: [a very long list of internal circuits and other parts] (Mukherjee, independent claim 17 Col. 34 Lns. 7-52)

However, even this latest advisory action mailed 2/21/2007, keeps referencing that the DSL modem described in Mukherjee discloses the parts and operational characteristics of the loop extender in independent claims 18, 44 and 45. The Advisory Action mailed in Feb. 2007 on page 2 in response to the latest amendment submitted by applicant states "Applicant's argument--- Mukherjee does not teach any details, either structural or operational, of the mentioned signal repeaters. Examiner disagrees. Examiner directs applicant to "Figs. 1, 4, 9, 10, 13; Col. 26, line 59 to col. 27 line 50 and col 18 lines 13-49 of Mukherjee. For more details see the rejections of claim 1 and 18 set forth in the office action mailed on Oct. 19, 2006.

Yet Mukherjee, in direct contrast to the Examiner's assertions that a loop extender is disclosed, states "FIG. 1 is an electrical diagram, in block form, of a digital subscriber line (DSL) modem system, illustrating the location of DSL modems both at the remote, end user, locations and also at a central office in the telephone system. (Mukherjee Col. 4 Lns. 15–19)

Similarily, Mukherjee, in direct contrast to the Examiner's assertions that a loop extender is disclosed, states "FIG. 4 is an electrical diagram, in block form, of the analog front end function *in* the central office *DSL modem* of the system of FIG. 1 according to the preferred embodiment of the invention. (Mukherjee Col. 4 Lns. 28–31)

Similarily, Mukherjee, in direct contrast to the Examiner's assertions that a loop extender is disclosed, states "FIG. 10 is an electrical diagram, in block form, of the analog front end function in the remote DSL modem of the system of FIG. 1 according to the preferred embodiment of the invention. (Mukherjee Col. 4 Lns. 51-54)

Similarily, Mukherjee, in direct contrast to the Examiner's assertions that a loop extender is disclosed, states "FIG. 13 is an electrical diagram, in schematic form, of an equalizer used in the receive side of the analog front end function [in the remote DSL modem] of FIG. 10 according to a first preferred embodiment of the invention. (Mukherjee Col. 4 Lns. 62-65)

The cited text in the Advisory Action, "Col. 26, line 59 to col. 27 line 50" is the text for figure 13 which, as underlined above, describes how the analog front end function in the remote DSL modem works and not how the signal repeaters discussed in the background of Mukherjee Col. 2 Lns 20 work.

Thus, Applicant respectfully disagrees with the Office Action's characterization of the prior art because Mukherjee fails to disclose all of the limitations of the claim. In particular, Mukherjee does not disclose configuring a loop extender. Furthermore, Mukherjee does not disclose the recited upstream and downstream elements of the loop extender.

The Office Action correctly recognizes that Mukherjee mentions signal repeaters, which are used to extend the otherwise limited operating range of a High-Bit-Rate Digital Subscriber Line (HDSL). The signal repeaters, a form of loop extender, are located on a loop between a central office and the Customer's premisis. Overall, Mukherjee does not teach any details, either structural or operational, of the mentioned signal repeaters. Thus, Mukherjee fails to disclose configuring the signal repeater in any way because the disclosure of Mukherjee is limited to simply mentioning, generally, that a signal repeater might be used in a HDSL system rather than discussing its operational and structural characteristics.

To beat a dead horse, the Office Action confuses the signal repeaters mentioned in the background section of Mukherjee with the other components of the DSL modem system described in the detailed description section. In particular, the detailed description section describes a DSL modem system (see Figure 1) with an analog front end modem (located at a central office) and a remote modem at an end user location such as a customer's house. Mukherjee, Figure 1. The disclosed DSL modem system does not include a signal repeater, or loop extender. Additionally, as Applicant mentioned in the previous response, Mukherjee specifically teaches that the DSL

modem system of Mukherjee is intended to be implemented without a signal repeater, or loop extender. See, Applicant's response mailed 8/1/06, pp. 15-16. "The background section of Mukherjee discusses that in some prior art DSL systems, the operating range is limited beyond which *signal repeaters* are required. However, Mukherjee explicitly teaches the use of integrated circuits and techniques within the central office and remote DSL modems as solutions for addressing such problems (see Brief Summary of the Invention Section of Mukherjee), rather than the use of repeater solutions.

It is improper for the Office Action to try to combine the different hardware components of the DSL modem system, in particular the capacitors and resistors of the analog front end modem, with the mere mention of a signal repeater to assert that Mukherjee purportedly teaches a loop extender with various upstream and downstream elements. In fact, Mukherjee does not teach any such loop extender, as recited in the claim, because Mukherjee teaches, at most, a signal repeater generally (no details of the signal repeater are provided) and a separate DSL modem system with certain hardware components. Mukherjee does not make any connection between the signal repeater and the hardware components of the analog front end modem referred to in the Office Action. This lack of disclosure by Mukherjee regarding a loop extender with specifically recited limitations fails to support a rejection under 35 U.S.C. § 102(e).

Furthermore, although the Office Action states that claim 18 is rejected under 35 U.S.C. § 102(e), it appears that the Office Action's reasoning is more closely related, although still unreasonable, to an obviousness-type argument to suggest that it might be obvious to combine the hardware components of the analog front end modem of the DSL modem system with the signal repeater. Even under an obviousness-type analysis, this suggestion lacks support because there is no disclosure that the different systems might be thus combined, and Mukherjee teaches away from using a signal repeater with the DSL modem system, as described above. Therefore, the reasoning provided in the Office Action would also fail to support a rejection under 35 U.S.C. §103. Accordingly, the Office Action fails to show how Mukherjee purportedly discloses a loop extender with the recited upstream and downstream elements. Since Mukherjee fails to disclose a loop extender, as recited in the claim, Mukherjee also fails to disclose

configuring a loop extender, as recited in the claim.

In contrast, claim 18 recites "configuring a loop extender" having specific upstream and downstream elements. For the reasons stated above, Mukherjee fails to disclose all of the limitations of claim 18. Given that the cited reference fails to disclose all of the limitations of the claim, Applicant respectfully submits that claim 18 is patentable over the cited reference. Accordingly, Applicant requests that the rejection of claim 18 under 35 U.S.C. § 102(e) be withdrawn.

Given that claims 19-30 and 48-49 depend from independent claim 18, which is patentable over the cited reference, Applicant respectfully submits that dependent claims 19-30 and 48-49 are also patentable over the cited reference. Accordingly, Applicant requests that the rejection of claims 19-25 under 35 U.S.C. § 102(e) and the rejection of claims 26 and 48-49 under 35 U.S.C. § 103(a) be withdrawn.

Response to Rejections under 35 U.S.C. § 103(a)

The Office Action rejected claims 1-10, 26, and 44-49 under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee. Applicant respectfully requests withdrawal of these rejections because the combination of cited references as discussed above fails to teach or suggest all of the limitations of the claims.

CLAIMS 1-17 AND 46-47

Claim 1 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee. Applicant respectfully submits that claim 1 is patentable over the combination of cited references because the combination does not teach or suggest all of the limitations of the claim. Claim 1 recites "a loop extender" having certain upstream and downstream elements. Although the language of claim 1 is different from the language of claim 18, and the scope of claim 1 is different from the scope of claim 18, Applicant respectfully submits that claim 1 is patentable over Mukherjee at least for the reasons described above, in particular the lack of disclosure by Mukherjee.

The only disclosure of Mukherjee is a non-descript reference to a signal repeater. This reference to a signal repeater does not indicate that the signal repeater does or might include specific hardware or functionality. Therefore, Mukherjee fails to disclose a

loop extender having specific impedances and elements.

Moreover, the teachings of Mukherjee related to the analog front end modem of the DSL modem system are inapposite to the reference to a signal repeater. For the sake of argument, even if the analog front end modem were to include impedances and/or elements similar to any of the recited limitations of the loop extender, Mukherjee nevertheless fails to teach or suggest a loop extender with the recited limitations because the analog front end modem is not a signal repeater, or a loop extender. Therefore, Mukherjee fails to teach or suggest all of the limitations of the claim.

In contrast, claim 1 recites "a loop extender" having certain upstream and downstream impedances and elements. For the reasons stated above, Mukherjee fails to teach or suggest all of the limitations of the claim. Accordingly, Applicant respectfully submits claim 1 is patentable over the cited reference.

Additionally, even if Mukherjee were to disclose all of the limitations of the claim, albeit in disparate hardware systems, the Office Action would also fail to provide a proper motivation or suggestion to combine the hardware components of the analog front end modem with the generic reference to the signal repeater. In fact, the Office Action does not even attempt to provide a possible motivation for such a combination. The Office Action simply ignores the requirement that there must be some motivation to combine the otherwise separate components purportedly individually referenced by Mukherjee. Furthermore, as described above, Mukherjee teaches away from combining the signal repeater with the DSL modem system, including the analog front end modem, in any way because the DSL modem system is intended to provide functionality to render the signal repeater unnecessary. Therefore, Mukherjee does not afford a suggestion or motivation to combine the hardware components of the analog front end modem with the referenced signal repeater. Given that Mukherjee does not provide a suggestion or motivation for such a combination, and the Office Action also fails to provide a suggestion or motivation for the purported reference, Application respectfully submits that the claim is patentable over the cited reference.

Given that the cited references fail to teach or suggest all of the limitations of the claim, and the Office Action fails to establish a motivation to combine the disparate teachings of the cited reference, Applicant respectfully submits that claim 1 is

patentable over the cited references. Accordingly, Applicant requests that the rejection of claim 1 under 35 U.S.C. § 103(a) be withdrawn.

Given that claims 2-17 and 46-47 depend from independent claim 1, which is patentable over the cited references, Applicant respectfully submits that dependent claims 2-17 and 46-47 are also patentable over the cited references. Accordingly, Applicant requests that the rejection of claims 2-10 and 46-47 under 35 U.S.C. § 103(a) be withdrawn.

Mukherjee fails by itself to adequately provide motivation to combine asserted well known features to achieve applicants claimed invention.

CLAIMS 44-45

In regard to claims 44 and 45, Applicant respectfully reasserts the arguments presented in the previous response. Applicant believes that this approach is fully responsive to the current Office Action and appropriate in light of the fact that the current Office Action fails to respond to Applicant's remarks related to the lack of evidentiary support.

In particular, Applicant traversed the rejections of claims 44 and 45 because Mukherjee fails to disclose sampling digital signals within DSL amplification circuitry. Although the Office Action acknowledges this lack of disclosure, the Office Action nevertheless purports that such sampling would have been obvious "in order to reduce the memory requirement for processing." However, as Applicant explained in the previous response, the cited reference does not offer such a motivation or suggestion for modifying Mukherjee to sample digital signals within DSL amplification circuitry. Even if Mukherjee were to disclose sample, and even if sampling were to potentially reduce processor memory requirements, in general, there is nevertheless no motivation or suggestion in the cited reference to modify Mukherjee to sample digital signals within DSL amplification circuitry, despite the conclusory assertion in the Office Action.

Once again, in regards to the Office Action's assertion that "it would have been obvious to a person of ordinary skill in the art to do sampling of SDL signals within the SLTE DSL amplification circuit and processing the sampled DSL signals in order to reduce the memory requirement for processing," it appears that the Office Action may

be attempting to improperly rely on facts which are not of record to arrive at applicants' claim limitation noted above. Applicants have previously requested some evidence, such prior art or a declaration of personal knowledge, of this assertion and the Examiner has yet to provide evidence of this assertion.

In order to properly support a rejection under 35 U.S.C. § 103, prior art reference must provide some motivation or suggestion to modify the reference to produce the claimed limitation or the examiner must make a proper finding of facts rather than stating a personal conclusion that something is obvious. Here, there is no disclosure of sampling digital signals within DSL amplification circuitry, and there is no motivation to modify the reference to sample digital signals within DSL amplification circuitry, even if sampling in other locations of the modem might reduce processor memory requirements. Therefore, given that the Office Action fails to provide a motivation or suggestion to modify the reference to sample digital signals within DSL amplification circuitry, the Office Action fails to support a rejection under 35 U.S.C. § 103. Accordingly, Applicant respectfully requests that the rejections of claims 44 and 45 be withdrawn.

Moreover, Applicant repeats the request from Applicant's previous response that the Examiner comply with the requirements of MPEP §2144.03(c) and provide evidentiary support if the current rejection of claims 44 and 45 is to be maintained.

Mukherjee fails to disclose all of the recited elements in claims 44 and 45.

It is also submitted that Mukherjee does not teach providing selectable DSL amplification or circuitry. In the system of Mukherjee, the DSL amplification is fixed. That is, once the system components are selected in Mukherjee through design, they are not changeable when the device is placed into operation. Thus, Mukherjee fails to disclose all of the recited elements in claims 44 and 45.

VIII. CONCLUSION

For the reasons stated above, claims 1-49 are patentable over the cited references. Thus, the rejections of claims 1-30 and 44-49 should be withdrawn. Appellant respectfully requests that the Board reverse the rejections of claims 1-30 and 44-49 and since there are no remaining grounds of rejection to be overcome, to direct the Examiner to enter a Notice of Allowance for claims 1-49. Applicants request a prayer for relief because this case has been through many rounds of examination with the examiner, and thus request the Board to direct the Examiner to enter a Notice of Allowance for claims 1-49. If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: 3-16-2007

/Thomas Ferrill/
Thomas Ferrill
Reg. No. 42,532

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025
(408) 720-8300

IX. CLAIMS APPENDIX

1. (Previously Presented) A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:

a loop extender capacitively coupled to the local loop, the loop extender comprising:

a plurality of upstream complex impedances coupled in parallel;

a plurality of downstream complex impedances coupled in parallel;

a first upstream filter and amplifying element coupled to the plurality of upstream complex impedances via a first switch; and

a first downstream filter and amplifying element coupled to the plurality of downstream complex impedances via a second switch.

2. (Original) The system of claim 1, wherein the first switch is configured to select one of the plurality of complex upstream impedances to approximately match the local loop impedance in a first direction along the local loop.

3. (Original) The system of claim 2, wherein the first direction is directed from the loop extender to a central office along the local loop.

4. (Original) The system of claim 1, wherein the second switch is configured to select one of the plurality of complex downstream impedances to approximately match the local loop impedance in a second direction.

5. (Original) The system of claim 4, wherein the second direction is directed from the loop extender to a customer premises along the local loop.

6. (Previously Presented) The system of claim 1, wherein the loop extender further includes:

at least one additional upstream filter and amplifying element coupled in parallel to the first upstream filter and amplifying element; and

at least one additional downstream filter and amplifying element coupled in parallel to the first downstream filter and amplifying element.

7. (Previously Presented) The system of claim 6, wherein a third switch selects either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements to provide upstream DSL signal amplification.

8. (Previously Presented) The system of claim 7, wherein the selection of either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements is based upon local loop length measured from the loop extender to a customer premises.

9. (Previously Presented) The system of claim 6, wherein a fourth switch selects either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements to provide downstream DSL signal amplification.

10. (Previously Presented) The system of claim 9, wherein the selection of either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements is based upon local loop length measured from the loop extender to a central office.

11. (Previously Presented) The system of claim 6, wherein the loop extender further comprises:

a first transformer coupled to the plurality of upstream complex impedances, a first inverting buffer, and either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements via a third switch to couple the plurality of upstream complex impedances, the first inverting buffer, and either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements via the third switch to the local loop; and

a second transformer coupled to the plurality of downstream complex impedances, a second inverting buffer, and either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements via a fourth switch to couple the plurality of downstream complex impedances, the second inverting buffer, and either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements via the fourth switch to the local loop.

12. (Previously Presented) The system of claim 11, wherein the loop extender further comprises:

a plain old telephone service (POTS) loading coil adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop; and

a diagnostic and control unit coupled to the local loop for providing communications, control, and diagnostic functionality.

13. (Previously Presented) The system of claim 12, wherein the diagnostic and control unit comprises:

a modem coupled to the local loop for communication with a central office;

an analog multiplexer and analog-to-digital converter (AMADC) for controlling the first, second, third, and fourth switches via switch control lines; and

a diagnostic and control processor (DCP) coupled to the modem and the AMADC for processing control signals received via the modem and sending the control signals to the AMADC.

14. (Original) The system of claim 13, wherein the first transformer is coupled to the local loop via a first bypass relay switch and the second transformer is coupled to the local loop via a second bypass relay switch.

15. (Original) The system of claim 14, further comprising a bypass relay for coupling the first and second bypass relay switches to the DCP.

16. (Original) The system of claim 15, wherein the DCP upon receiving control signals from the central office, decouples the first and second transformers from the local loop by activating a deactivated bypass relay.

17. (Original) The system of claim 15, wherein the DCP upon receiving control signals from the central office, couples the first and second transformers to the local loop by deactivating an activated bypass relay.

18. (Previously Presented) A method of improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:

configuring a loop extender with

a plurality of upstream complex impedances coupled in parallel;

a plurality of downstream complex impedances coupled in parallel;

a plurality of upstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of upstream complex impedances; and

a plurality of downstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of downstream complex impedances.

19. (Previously Presented) The method of claim 18, wherein the method comprises selecting one of the plurality of complex upstream impedances to approximately match a local loop impedance in a first direction along the local loop.

20. (Original) The method of claim 19, wherein the first direction is directed from the loop extender to a central office along the local loop.

21. (Previously Presented) The method of claim 18, wherein the method comprises selecting one of the plurality of complex downstream impedances to approximately match a local loop impedance in a second direction along the local loop.

22. (Original) The method of claim 21, wherein the second direction is directed from the loop extender to a customer premises along the local loop.

23. (Previously Presented) The method of claim 18, wherein the method further comprises selecting one of the plurality of upstream filter and amplifying elements to provide upstream DSL signal amplification.

24. (Previously Presented) The method of claim 23, wherein the selection of one of the plurality of upstream filter and amplifying elements is based upon local loop length measured from the loop extender to a customer premises.

25. (Previously Presented) The method of claim 18, wherein the method further comprises selecting one of the plurality of downstream filter and amplifying elements to provide downstream DSL signal amplification.

26. (Previously Presented) The method of claim 25, wherein the selection of one of the plurality of downstream filter and amplifying elements is based upon local loop length measured from the loop extender to a central office.

27. (Previously Presented) The method of claim. 18, further comprising:

configuring the loop extender with

a first transformer for coupling the plurality of upstream complex impedances, a first inverting buffer, and one of the plurality of downstream filter and amplifying elements to the local loop; and

a second transformer for coupling the plurality of downstream complex impedances, a second inverting buffer, and one of the plurality of upstream filter and amplifying elements to the local loop.

28. (Previously Presented) The method of claim 27, further comprising:

improving transmission of plain old telephone service (POTS) band signals over the local loop via a POTS loading coil coupled to the local loop; and

providing communications, control, and diagnostic functionality via a diagnostic and control unit coupled to the local loop.

29. (Previously Presented) The method of claim 28, wherein providing communications, control, and diagnostic functionality comprises:

communicating with a central office via a modem coupled to the local loop;

processing control signals received via the modem;

selecting one of the plurality of downstream complex impedances based upon the processed control signals;

selecting one of the plurality of upstream complex impedances based upon the processed control signals;

selecting one of the plurality of upstream filter and amplifying elements based upon the processed control signals; and

selecting one of the plurality of downstream filter and amplifying elements based upon the processed control signals.

30. (Previously Presented) The method of claim 29, wherein the method further comprises uncoupling the first transformer and the second transformer from the local loop in accordance with the processed control signals.

31. (Previously Presented) A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:

selectable line termination and equalization (SLTE) DSL amplification circuitry capacitively coupled to the local loop via bypass relay switches;

a plain old telephone service (POTS) loading coil adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop; and

a diagnostic and control unit coupled to the local loop for receiving and processing control signals from a central office, coupled to the bypass relay switches via a bypass relay for controlling the bypass relay switches, and coupled to the SLTE DSL amplification circuitry via a plurality of switch control lines for controlling the SLTE DSL amplification circuitry.

32. (Previously Presented) The system of claim 31, wherein the SLTE DSL amplification

circuitry comprises:

a plurality of upstream complex impedances coupled in parallel and selectable via a first switch;

a plurality of downstream complex impedances coupled in parallel and selectable via a second switch;

a plurality of upstream filter and amplifying elements coupled in parallel and selectable via a third switch;

a plurality of downstream filter and amplifying elements coupled in parallel and selectable via a fourth switch;

a first transformer to couple the plurality of upstream impedances, the fourth switch, and a first inverting buffer to the local loop;

a second transformer to couple the plurality of downstream impedances, the third switch, and a second inverting buffer to the local loop;

a first non-inverting buffer to couple the first switch and the first inverting buffer to the plurality of upstream filter and amplifying elements; and

a second non-inverting buffer to couple the second switch and the second inverting buffer to the plurality of downstream filter and amplifying elements.

33. (Original) The system of claim 32, wherein the first switch is controlled via a first switch control line, the second switch is controlled via a second switch control line, the third switch is controlled via a third switch control line, and the fourth switch is controlled via a fourth switch control line.

34. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit-is configured to instruct the first switch to select one of the plurality of complex upstream impedances in response to the control signals received from the central office.

35. (Original) The system of claim 34, wherein the one of the plurality of complex upstream impedances selected approximately matches the local loop impedance in a first direction along the local loop.

36. (Original) The system of claim 35, wherein the first direction is directed from the SLTE DSL amplification circuitry to the central office along the local loop.

37. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit is configured to instruct the second switch to select one of the plurality of complex downstream impedances in response to the control signals received from the central office.

38. (Original) The system of claim 37, wherein the one of the plurality of complex downstream impedances selected approximately matches the local loop impedance in a second direction along the local loop.

39. (Original) The system of claim 38, wherein the second direction is directed from the SLTE DSL amplification circuitry to a customer premises along the local loop.

40. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit-is configured to instruct the third switch to select one of the plurality of upstream filter and amplifying in response to the control signals received from the central office.

41. (Previously Presented) The system of claim 40, wherein the one of the plurality of upstream filter and amplifying elements selected is based upon local loop length measured from the SLTE DSL amplification circuitry to a customer premises.

42. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit, in response to the control signals received from the central office, instructs the fourth switch to select one of the plurality of downstream filter and amplifying elements.

43. (Previously Presented) The system of claim 42, wherein the one of the plurality of downstream filter and amplifying elements selected is based upon local loop length measured from the SLTE DSL amplification circuitry to the central office.

44. (Previously Presented) A method for improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:

transmitting control signals and DSL signals over the local loop;

providing DSL signal amplification via selectable line termination and equalization (SLTE) DSL amplification circuitry coupled to the local loop;

receiving the control signals via a diagnostic and control unit (DCU) coupled to the local loop;

processing the control signals;

selecting SLTE DSL amplification circuitry switch states in accordance with the processed control signals;

sampling DSL signals within the SLTE DSL amplification circuitry;

processing the sampled DSL signals;

selecting SLTE DSL amplification circuitry switch states in accordance with the processed sampled DSL signals to improve SLTE DSL amplification circuitry performance; and

uncoupling SLTE DSL amplification circuitry from the local loop in accordance with the processed control signals.

45. (Previously Presented) A system for improving transmission of digital subscriber line (DSL) signals, the system comprising:

means for transmitting control signals and DSL signals;

means for providing selectable DSL signal amplification coupled to the means for transmitting;

means for receiving the control signals coupled to the means for providing DSL signal amplification;

means for processing the control signals to generate processed control signals;

means for improving performance of the means for providing DSL signal amplification in accordance with the processed control signals;

means for sampling the DSL signals within the means for providing selectable DSL signal amplification;

means for processing the sampled DSL signals to generate processed sampled

DSL signals;

means for improving performance of the means for providing DSL signal amplification in accordance with the processed sampled DSL signals; and

means for uncoupling the means for providing DSL signal amplification from the means for transmitting in accordance with the processed control signals.

46. (Previously Presented) The system of claim 1, wherein:

operations of the first upstream filter and amplifying element are combined into a first discrete element; and

operations of the first downstream filter and amplifying element are combined into a second discrete element.

47. (Previously Presented) The system of claim 1, wherein:

operations of the first upstream filter and amplifying element are separated into a first discrete filter element and a first discrete amplifying element; and

operations of the first downstream filter and amplifying element are separated into a second discrete filter element and a second discrete amplifying element.

48. (Previously Presented) The system of claim 18, wherein:

operations of each of the plurality of upstream filter and amplifying elements are combined into a first discrete element; and

operations of each of the plurality of downstream filter and amplifying elements are combined into a second discrete element.

49. (Previously Presented) The method of claim 18, wherein:

operations of each of the plurality of upstream filter and amplifying elements are separated into a first discrete filter element and a first discrete amplifying element; and

operations of each of the plurality of downstream filter and amplifying elements are separated into a second discrete filter element and a second discrete amplifying element.

X. EVIDENCE APPENDIX

There is no evidence submitted with this Appeal Brief.

XI. RELATED PROCEEDINGS APPENDIX

To the best of Applicants' knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.